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Ecological Study of the Filamentous Bacteria in the Mixed Liquor of Activated Sludge: 1-Year Sampling of 16 WWTP from the North of Portugal

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The excessive growth of filamentous bacteria in activated sludge processes has deserved increased interest from managers and technicians and, more recently, by microbiologists around the world. In Portugal, this kind of study has never been conducted and no data exist on the prevalence of filamentous bacteria.

The present work is focused on the prevalence, dominance and frequency of the different morphotypes, aiming at increasing the knowledge of the ecology of these microorganisms.

The sampling was carried out for one year in 16 activated-sludge wastewater treatment plants (WWTP) from the north of Portugal. The mixed liquor samples have shown large amounts of various bacterial filaments during the study period, including Nocardioforms, Microthrix parvicella, T0581, T0041/0675, T0914, T0961, T0092, T1851, T0803, T1701, Nosticola limicola I, II and III, Sphaerotilus natans, Haliscomenobacter hydrossis and Thiothrix spp..

The study revealed that T0041/0675, Microthrix parvicella, T0092 and Nocardioformes, T1851, T0914 and Thiothrix spp. were the most frequent morphotypes by this order. These filamentous morphotypes appeared in significant amount in, at least, 50 % of the samples.

The filamentous T0041/0675, T0092, Microthrix parvicella, T1851 and Thiothrix spp. were the most abundant, considering all samples, by this order. The dominant bacteria morphotypes in the studied samples appeared by a slightly different order: Microthrix parvicella >T0041/0675 > T0092 > T1851 and Thiothrix spp..

The abundance of Microthrix parvicella lowered in the summer period in most of the WWTP where it occurred, which is consistent with literature data. Only in 3 of the 16 WWTP the dominant morphotypes changed significantly along the 12-month sampling period. Globally, general patterns of frequency, abundance and dominance could be established but the research team felt that there is an urgent need to develop the current alternative methods to identify filamentous bacteria of activated sludge, namely at increasing the existing set of fluorescent probes.

Keywords: Wastewater, activated-sludge, filamentous bacteria

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